HUMAN ADAPTATIONS AND PLEISTOCENE ENVIRONMENTS IN SOUTH CHINA

ABSTRACT: Human adaptations and Pleistocene environments will be discussed in this paper. During the past two decades, there were several hundreds Palaeolithic localities found in South China. These provide more detailed information on the history of human evolution in this region. Pleistocene environments changed through space and time, but they were mainly dominated by tropical or sub-tropical forests except some temporal temperate grasslands in the northern part. Pebble-tool industries existed in river valleys of the eastern plain areas from the late Lower Pleistocene to early Upper Pleistocene. These were replaced by flake industries in the late Upper Pleistocene. Only flake industries were found in cave sites of Western mountain areas. From stone tool industries to settlement patterns, human adaptations in the tropics and sub-tropics of East Asia seem to be more complex than the Bamboo Hypothesis supposed.

KEY WORDS: South China – Human adaptation – Pleistocene environment – Palaeolithic – Human evolution

INTRODUCTION

Since modern Chinese archaeology began in the early 1920s, Palaeolithic excavations and research have been mainly carried out in North China. From the 1950s, Pleistocene human fossils were occasionally found by local people at limestone caves or at construction sites near the river banks, such as the Ziyang, Changyang and Maba hominid fossils (Wu, Olson 1985). The first important Palaeolithic site was excavated in South China at Guangzhou Province, in the mid 1960s. Until the mid 1970s, there were only a few Palaeolithic sites found in caves of the limestone mountain areas in South China.

Contrasting the poor discoveries, many scholars have focused their research on East and Southeast Asia, including the huge area of South China, for a long time. As a result different hypotheses have been developed to explain the Palaeolithic remains of this region. The well-known Movius Line was set up during the 1940s, and still has influence even today (Movius 1944, 1948, Clark 1977, Klein 1989, Schick 1994). Since the late 1970s, some scholars began to emphasize the influence of particular environments in the tropical and subtropical Far East. They thought that bamboo and other wooden materials replaced the lithic tools in this region (Harrison 1978, Pope 1989, Reynolds 1993).

However, just during the past twenty years, several hundred Palaeolithic localities have been found in South China, and the numbers are still increasing fast. In the meantime, researches of Quaternary geology and related disciplines also provide much more knowledge about Pleistocene environment and chronology. These developments bring more information about human evolution in the Far East. This paper will introduce some new Palaeolithic discoveries in South China, and discuss the human adaptations and Pleistocene environments of this region.
CHRONOLOGY AND ENVIRONMENT

The mainland of South China lies on the south-eastern part of the Asian continent, between approximately 20°-33°N and 100°-122°E. It encompasses the valleys of the middle and lower reaches of Changjiang river and its tributaries, the Jiangnanqingshan mountains and the valley of Zhuijiang river in the East, the Yinguai Plateau and Sichuan Basin in the West. The physical features vary from place to place, and there are many different local environments in South China. Archaeology has confirmed that Pleistocene hominids occupied this area for a long time.

Chronology

The date of the earliest occupation in South China is still controversial. This includes the discoveries at Yuanmou and Longgupo (Wu, Olson 1985; Huang et al. 1991, 1995). According to the biostratigraphic and magnetic stratigraphy, the date of the Longgupo hominid and artifacts is ca 1.9 to 1.7 myr, which would be the earliest occupation in China as well as in East Asia, but the majority of Palaeolithic and hominid fossils in South China are not older than 1 myr.

Recently the developments of Quaternary chronology research in South China, especially the multidisciplinary works associated with Palaeolithic archaeology, have established a basic chronological framework. An important contribution to Pleistocene chronology is the multidisciplinary research in the Xiangyang site, near Xuanzhou City, Anhui Province (Figure 1). The stratigraphic section of Xiangyang includes 15 layers, which are dated to about 0.8 to 0.1 myr by the ESR method (Zhao, Yang 1995). Compared to the typical stratigraphic section of loess in Luochuan, Shaanxi Province of Northwest China, the age of the Xiangyang site is reasonable.

On the other hand, several important human fossils were found in this region during the last two decades. These include the Hexian, Nanjing and Yuanxian hominids. The age of Nanjing Homo erectus is about 350 kyr, based on uranium series and ESR (Nanjing City Museum and Department of Archaeology at Peking University 1996). The new dating of Hexian reported by Huang and his colleague (1995) is about 360 kyr. When compared with these two Homo erectus, the archaic Homo sapiens of Yuanxian is older, dated to 580 kyr by ESR method (Chen et al. 1996). Many other faunas or radiometric dates also confirm that early man occupied this region from the late Lower Pleistocene until the end of the Pleistocene.

Environment

The Pleistocene environment is very important for understanding human adaptations in South China. There were several factors that had strong influences on palaeoenvironments. Among these were the tectonic movements, the global climatic changes, local geographic and geological conditions.

One important result of tectonic movement was the uplift of the Qinghai-Xizang Plateau in the West of South China, and Qingshling Mountains in the Northwest (Li 1979, Wu et al. 1992). The high plateau and mountains created high physical barriers, and isolated the region from the western part of the Old World as well as from North China. Since the Lower Pleistocene or earlier, South China gradually became an independent geographical unit (Wang 1995, 1997).

The uplift of the Qinghai-Xizang Plateau also changed the global climatic system and formed the regional monsoon climate (Qi 1989). Under the influence of the monsoon the precipitation of South China is higher than in other regions at the same latitude. The Ailuropoda-Stegodon-fauna existed in South China from the Lower Pleistocene to Upper Pleistocene, which is a fact associated with the tropical and sub-tropical forest environment (Wu, Olson 1985). The new data from multidisciplinary research also indicate that the Pleistocene environments of South China should be mainly sub-tropical or tropical climate with more forests, especially in the southern part (Shi et al. 1989).

Even though climate was mainly warm and wet, the influences of global climatic cooling were nevertheless recorded in the Quaternary sediments of South China, most clearly in the northern part. As mentioned above, the multidisciplinary research on the Xiangyang site has provided not only the chronological framework but also records of climatic changes in South China from the late Lower Pleistocene to the early Upper Pleistocene (see Figure 2).

FIGURE 1. Xiangyang section and loess section (from Zhao, Yang 1995).

FIGURE 2. a) Middle Pleistocene environment of East China in the warmest period (from Huang et al. 1987); b) Upper Pleistocene environment of East China (16-15 kyr BP) (from Huang et al. 1987).
Figure 1). The Xiangyang stratigraphic section has nine cycles of loess and palaeo-soil, which can be compared with the Luochuan Section, the typical loess stratigraphic section in North China (Fang et al. 1992, Zhao, Yang 1995). During the glacial period, the climate became dry and cold, the temperate grassland moved more to the South and covered a large area in the North of Nandling Mountains (Figure 2b). In the interglacial phases, the tropical and subtropical forests moved toward the north and occupied all South China, while sometimes spreading even farther north (Figure 2a) (Huang et al. 1987).

The variation of geological and geographical conditions also contributed to the local environments. There were more plentiful rocks for raw materials in the mountain areas, while pebbles were the only resource of stone in the river valley or basin areas. Vegetation also was different between the highland-mountain areas and the valley of rivers or margin of lakes. All of those factors combined together to form many distinctive regional environments in South China during the long period of Pleistocene. These were the backgrounds of human evolution in this part of the Old World.

ARCHAEOLOGICAL RECORDS

The Southeast

Almost all of the new discoveries of Palaeolithic archaeology made in South China during the last two decades come from this region. They include several hundred lithic localities as well as several important hominid fossils such as Hexian, Yunnian and Nanjing. The lithic localities are mainly distributed along river banks and concentrated on the valley plains of different rivers, especially in the Hanshui Valley, the valleys of the middle and lower reaches of Changjiang River, the Yuanshui River Valley as well as the Youjiang River Valley. Only a few cave sites are located in this region, most of them dated to the late Upper Pleistocene.

The Hanshui Valley

The Hanshui Valley crosses the mountains of Southern Shaanxi and Northwestern Hubei. It consists of several basins, including the Hanzhong, the Ankang and the Yunnian. Many pebble tools were found in the high terrace of the Hanshui River. The most important discovery of this region is the Yunnian human fossils and associated lithic assemblages in the Yunnian Basin (Li et al. 1991, 1994, Etter, Li 1994). But more Palaeolithic localities have been reported from the Hanzhong Basin (Tang et al. 1987, Huang, Qi 1987). There were also several cave sites found in this area (Huang et al. 1987, Wang et al. 1988).

The earliest occupation of this area was probably during the late Lower Pleistocene. Only a few isolated teeth attributed to Homo erectus were collected from several caves (Wu, Olsen 1985). The Yunnian skull with more archaic Homo sapiens features is dated to 800 ky.
The Zhujiang River Valley

The Zhujiang River valley lies in the southern part of Southeast China. It is a rather mountainous region. The climate is warmer, and changed from tropical to subtropical during the Pleistocene. Compared with the North region, there are more cave sites in this area and most of them dated to the Upper Pleistocene. The open air sites are similar to the North in both the age and distribution.

A larger number of open air localities have been found in the Baise Basin of the Youjiang River, a tributary of the upper reach of the Zhujiang River. The lithic assemblage consists of pebble tools, but the inventory is different from the North. Pointed tools are still important artifacts, but they are of a different shape. Most of them were worked into a U-shape point, which seems to have had a special function. Many pointed tools are bifaces similar to Acheulian handaxes (Huang 1987, 1991, 1993). There are many choppers too but no spheroids are found in this area.

When re-examining the sediment yielding the Maba archeic Homo sapiens skull, two pebble tools were found (Song et al. 1988). Pebble tools are also associated with the modern human fossil in Baqijian, a cave site in Guuling, Guangxi (Wang et al. 1982). Some flake tools appeared in this area by the late Upper Pleistocene. The early flake tool assemblages in Baiilandong consist of side scrapers, points and other small tools. These are made on flint or chert and are retouched carefully. However, the later remains from this cave site are dominated once again by pebble tools (Zhou 1994).

The Southwest

The Palaeolithic remains of the Southwest have been found in both the Yunnan-Guizhou Plateau and the Sichuan Basin. The features of stone tool industries and settlement patterns differ considerably between the two regions.

The Yunnan-Guizhou Plateau

The earliest occupation of this plateau – mountainous region is found in Yuanmou, Yunnan, and includes two teeth of Homo erectus and several stone artifacts dated to the Lower Pleistocene or Middle Pleistocene (Liu, Ding 1983, Qian 1985). More evidence of early man's adaptation in this area come from a number of cave sites.

Among the cave sites, the Guanyindong in Qianxi County, Guizhou Province, is one of the earliest. It has plentiful cultural remains, both stone artifacts and animal bone fossils. The site is located in a corner of a small Karst basin, surrounded by limestone hills. The main excavated area is the western entrance, where the sediment is about 4 meters thick and includes 7 cultural layers dating from 190 ky to 40 ky (Yuan et al. 1986, Shen, Jin 1992). Even though early man visited this cave many times and occupied it for a long time, the lithic assemblages are the same from the lowest layer to the top. Lithic raw materials came from nearby, within 2 km of the site, and include siliceous limestone, vein rock and chert etc. The principal means of reducing nuclei and retouching tools was simple direct percussion with a hard hammer. The lithic inventories include side scrapers, end scrapers, points and choppers.
The flake or small flake tool industries were the first in the mountain or plateau region of the Southwest. There were plentiful natural caves, a variety of lithic raw materials and open environments with more grassland vegetation. In these regions, flake tool industries replaced ground pebble tools in the late Upper Pleistocene when the temperate grassland arrived in this area during the last glacial period. The site density of flake tool industries is far lower than the late Pleistocene and the site locations are widely separated along, averaging 26.1 m in length and 19.2 m in width. Only a few species of animals were found, including Ursus thibetanus, Sus sp. indet., Rusa sp. indet. and Muntiacus sp. From the evidence, the site was probably occupied by hunters at the last glacial maximum. Comparison with the local modern ecological conditions suggests that the residents of Fulin site lived in a mountainous grassland environment.

DISCUSSION

According to this brief examination of archaeological records of South China, we can see that the Pleistocene human adaptations varied through time and space. The pebble tool industries mainly occupied the ancient river banks or lake margins in the plain areas. The flake or small flake tool industries were distributed over the mountain and plateau region in the early period, and later also in the lowland areas.

The earliest pebble tool industries occupied this region during the late Lower Pleistocene, and lasted until the early Upper Pleistocene, in some places even later. The regional Quaternary geology research has provided a general environmental background for this region. There were mainly tropical or sub-tropical climates during most of the Pleistocene in South China. The northern part was sometimes influenced by temperate climate. Under the conditions of warm and wet climate influenced by the monsoon, forest was the major vegetation in the Southeast, especially in the southern part. According to the beetles from the Pleistocene deposits, the site density of woodland vegetation and plentiful pebbles for raw materials in ancient river banks and lake margins attracted early hominids over a long time span. The distribution of the lithic localities reflected the land use of the early residents of this region. A group of sites in a river valley probably represented the territory of a group of Pleistocene hominids. A site such as Jingzhuang with a large number of stone artifacts should have been a main site or region for the multi-functions of tool making, food processing and so on. Around the main site, more localities with only a few artifacts indicate temporary activities. When compared with the earliest occupation by Homo in China (Clark 1994, Liu 1996, and present research there seem to be no differences of the land use between the early hominids of South China and the West. In both regions early hominids concentrated their subsistence activities along the river and lake margins (Leakey 1971, Bar-Yosef, Goren-Inbar 1993).

The differences in the flake tool industries in the mountain and plateau region of the Southwest. There were plentiful natural caves, a variety of lithic raw materials and open environments with more grassland vegetation. In these regions, flake tool industries replaced ground pebble tools in the late Upper Pleistocene when the temperate grassland arrived in this area during the last glacial period. The site density of flake tool industries is far lower than the late Pleistocene and the site locations are widely separated along, averaging 26.1 m in length and 19.2 m in width. Only a few species of animals were found, including Ursus thibetanus, Sus sp. indet., Rusa sp. indet. and Muntiacus sp. From the evidence, the site was probably occupied by hunters at the last glacial maximum. Comparison with the local modern ecological conditions suggests that the residents of Fulin site lived in a mountainous grassland environment.

The new developments of archaeology and related disciplines have provided more information about human adaptations and the Pleistocene environments in South China. Global climate changes and local geological and geographical conditions created many distinctive regional environments, and the uplift of the Xizang-Qinghai Plateau isolated the region from the rest of the Old World. When hominids migrated to this region, they had to adapt to the special environment (Gamble 1993). The pebble tool industries lasted such a long time that they were obviously related to tropical or subtropical forest environments, while the flake tool industries were the results of adapting to more open grassland environments. Local lithic raw materials were also an important reason leading to the development of two distinctive stone tool industries. In the valleys of rivers or margins of lakes in the lowland areas, pebbles were the only resources for stone tool making, and here the pebble tool industries could therefore exist such a long time. The mountain or karst highland regions had more stone raw materials, but generally speaking, South China lacked high quality lithic raw materials such as flint, which could be one of the factors that resulted in irreglar flake tool industries dominating this region. On the other hand, the Xizang-Qinghai Plateau blocked cultural exchange between the East and West. This is probably the reason for the pelvic, chopper, pointed tools and even spheroids dominating in different lithic assemblages. This indicates that lithics were still the basic tool for Pleistocene hominids in the Far East. Forest environments could provide more plant food in the tropical and subtropical region, but at least big game hunting or scavenging activities existed in Southwest China too. These new discoveries of the Palaeolithic in South China seem to be more complex than can be explained by the bamboo hypothesis.

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